

In the Claims:

Please cancel claims 1-24.

Remaining claims are claims 25-46.

25. A method for fabricating a magnetic tunnel junction (MTJ) sensor for use in a magnetic read head having an air bearing surface (ABS), the method comprising the unordered steps of:

(a) forming a MTJ stack with an active region disposed at the ABS and having two opposite sides each disposed generally orthogonally to the ABS, including the unordered steps of:

(a.1) forming an antiferromagnetic (AFM) layer,

(a.2) forming a pinned layer of ferromagnetic (FM) material in contact with the AFM layer,

(a.3) forming a free layer of FM material,

(a.4) forming a tunnel junction layer of electrically nonconductive material disposed between the pinned layer and the free layer, and

(a.5) removing all material outside of the active region from the AFM layer, the pinned layer, and the tunnel junction layer to define the two opposite sides of the active region; and

(b) forming a longitudinal bias layer outside of the active region in contact with the free layer for biasing the magnetic moment of the free layer in substantially a predetermined direction in the absence of an external magnetic field.

26. The method of claim 25 further comprising the step of:

(c) forming an insulating layer of electrically nonconductive material on and in contact with the free layer outside of the active region and in abutting contact with the two opposite sides of the active region.

27. The method of claim 26 wherein the longitudinal bias layer is disposed without contacting the active region.

28. The method of claim 27 wherein the longitudinal bias layer comprises a hard magnetic (HM) material.

29. The method of claim 27 wherein the longitudinal bias layer comprises an AFM material.

30. The method of claim 25 wherein the longitudinal bias layer is disposed without contacting the active region.

31. The method of claim 30 wherein the longitudinal bias layer comprises a HM material.

32. The method of claim 30 wherein the longitudinal bias layer comprises an AFM material.

33. The method of claim 25 wherein the forming step (b) further comprises the step of:

(b.1) forming a nonconductive longitudinal bias layer outside of the active region and in abutting contact with the two opposite sides of the active region for biasing the magnetic moment of the free layer in substantially a predetermined direction in the absence of an external magnetic field.

34. The sensor of claim 33 wherein the nonconductive longitudinal bias layer comprises a HM material.

35. The sensor of claim 33 wherein the nonconductive longitudinal bias layer comprises an AFM material.

36. The method of claim 25 wherein the removing step (a.5) further comprises the step of:

(a.5.1) removing all material outside of the active region from the AFM layer, the pinned layer, the tunnel junction layer and the free layer to define the two opposite sides of the active region.

37. The method of claim 36 wherein the forming step (b) further comprises the step of:

(b.1) depositing additional FM material on the free layer in the active region and beyond the two opposite sides of the active region.

38. The method of claim 37 further comprising the step of:

(c) forming an insulating layer of electrically nonconductive material on and in contact with the free layer outside of the active region and in abutting contact with the two opposite sides of the active region.

39. The method of claim 38 wherein the longitudinal bias layer is disposed without contacting the active region.

40. The method of claim 39 wherein the longitudinal bias layer comprises a hard magnetic (HM) material.

41. The method of claim 39 wherein the longitudinal bias layer comprises an AFM material.

42. The method of claim 37 wherein the longitudinal bias layer is disposed without contacting the active region.

43. The method of claim 42 wherein the longitudinal bias layer comprises a HM material.

44. The method of claim 42 wherein the longitudinal bias layer comprises an AFM material.

45. The method of claim 36 wherein the forming step (b) further comprises the step of:

(b.1) forming a nonconductive longitudinal bias layer outside of the active region and in abutting contact with the two opposite sides of the active region for biasing the magnetic moment of the free layer in substantially a predetermined direction in the absence of an external magnetic field.

46. The method of claim 45 wherein the nonconductive longitudinal bias layer comprises a hard magnetic (HM) material.

In the Abstract:

Page 27 lines 1-2, delete the title "A MAGNETIC TUNNEL JUNCTION SENSOR WITH NON-SHUNTING STABILIZATION" and insert new title --A METHOD FOR MANUFACTURING A MAGNETIC TUNNEL JUNCTION SENSOR WITH NON-SHUNTING STABLIZATION--.